Appendix A – IT Inventory Analysis
Server Location Analysis

Protections for Locations and Servers by Type						
	HVAC	**Fire Suppression**	**Condition Power**	**Battery/UPS Power**	**Controlled Access**	**Generator Power**
Sites Yes	**80**	**53**	**84**	**139**	**107**	**7**
%	27%	18%	29%	47%	37%	2%
Sites No	**213**	**240**	**209**	**154**	**186**	**286**
%	73%	82%	71%	53%	63%	99%
Total Sites	293	293	293	293	293	293
Servers Yes	**641**	**500**	**651**	**706**	**738**	**361**
%	69%	54%	70%	76%	79%	39%
Servers No	**293**	**434**	**283**	**228**	**196**	**573**
%	31%	46%	30%	24%	21%	61%
Total Servers	934	934	934	934	934	934
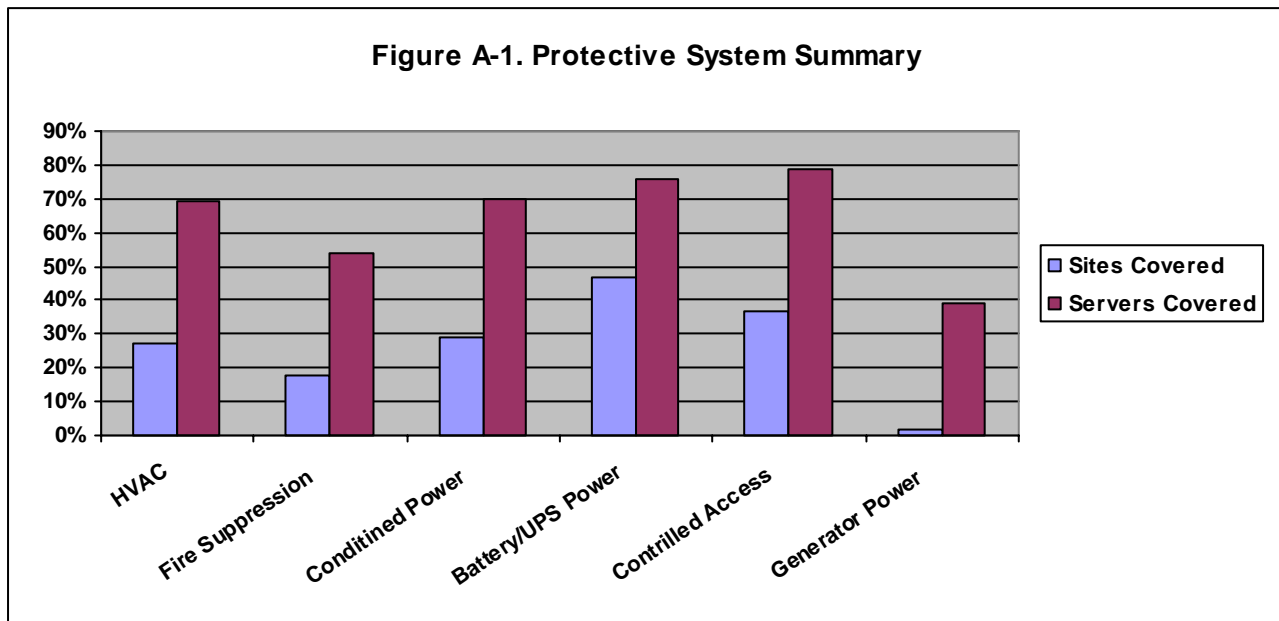
Figure A-1. Protective System Summary

Discussion: There are 293 sites, housing 934 physical servers, which store and run the state's software applications. Due to their critical nature, data centers are typically designed to have special environmental protections in place. The typical protections are:

- HVAC (heating, ventilation, air-conditioning
- Fire suppression system
- Conditioned power source the eliminates voltage drops and peaks
- Battery backup for power during temporary outages
- Local/controlled access
- Generators for alternate power source over extended periods

Figure A-1 illustrates the percentage of servers and sites covered by the typical protective systems.

There appears to be great disparity among the levels of protection installed for the state's data centers. The larger data centers typically have most of the standard protective systems listed above; however, many of the smaller data centers have few or none of the critical protective systems in place.

Appendix A – IT Inventory Analysis
Server Location Analysis

Protections for Locations and Servers								
Level of Coverage	0	1	2	3	4	5	6	Total
Sites	122	35	51	24	47	11	3	293
%	42%	12%	17%	8%	16%	4%	1.0%	
Servers	132	27	124	50	134	172	295	934
%	14%	3%	13%	5%	14%	18%	32%	
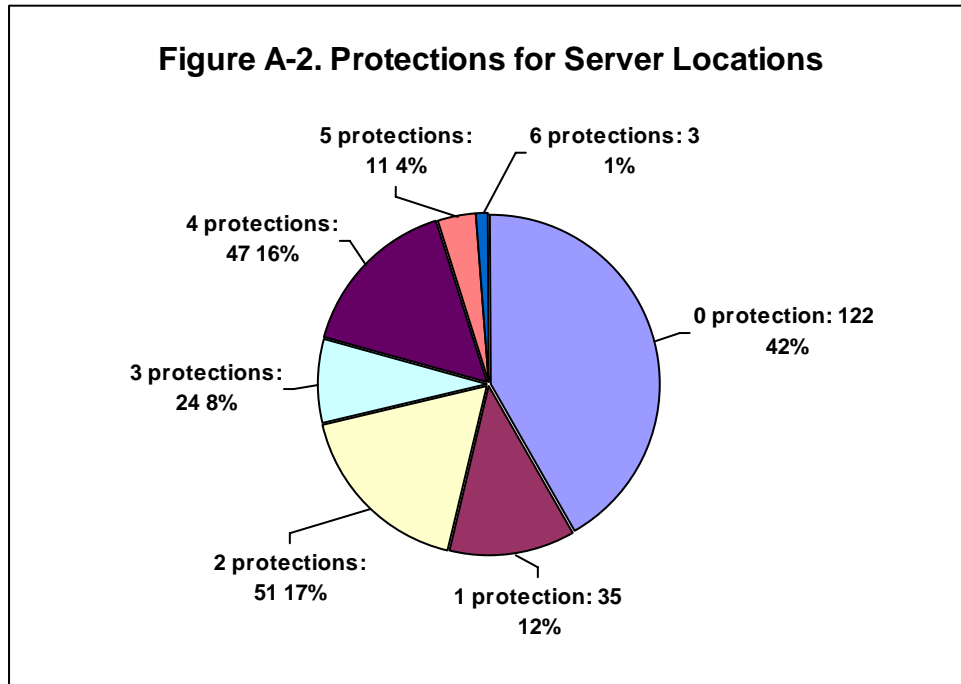
Figure A-2. Protections for Server Locations

Discussion: There are 293 sites, housing 934 physical servers, which store and run the state's software applications. Due to their critical nature, data centers are typically designed to have special environmental protections in place. The typical protections are:

- HVAC (heating, ventilation, air-conditioning
- Fire suppression system
- Conditioned power source the eliminates voltage drops and peaks
- Battery backup for power during temporary outages
- Local/controlled access
- Generators for alternate power source over extended periods

Figure A-2 illustrates the breakdown of the protection level for servers.

While only three sites that have all six levels of protection (the ITSD data center in the Mitchell Building, DOJ at Fort Harrison, and MDT), 295 or 32% of the state's servers are located at those three locations, 601 or 64% of the State's servers are located in sites with four or more protections. A total of 157 or 17% of servers are in isolated locations that have one or no protections.

Appendix A – IT Inventory Analysis
Server Analysis

| Number of Servers by Agency	Physical Servers	Physical with Virtual	Virtual Servers	Total Servers	SAN
AGR	6	0	0	6	0
ART	1	0	0	1	0
CHE	4	0	0	4	0
COR	46	0	0	46	3
CPP	1	0	0	1	0
DEQ	17	0	0	17	5
DLI	66	0	0	66	5
DMA	2	0	0	2	0
DNR	28	0	0	28	0
DOA	1	0	0	1	0
DOC	40	0	0	40	0
DOJ	44	2	5	47	0
DOR	60	0	0	60	0
FWP	26	0	0	26	5
GOV	2	0	0	2	0
HHS	119	0	0	119	0
HIS	2	0	0	2	0
ISD	207	17	154	344	0
JUD	40	0	0	40	0
LEG	3	0	0	3	1
LIV	4	0	0	4	0
LOT	1	0	0	1	0
MDT	86	0	0	86	1
MSL	19	0	0	19	8
OPI	14	0	0	14	4
PER	1	0	0	1	0
PSC	5	0	0	5	0
SAO	4	0	0	4	0
SDB	7	0	0	7	0
SOS	8	0	0	8	2
STF	64	2	4	66	18
TRD	6	0	0	6	
Total	**934**	**21**	**163**	**1076**	**52**

Discussion: The state has 934 servers in operation hosing more than 1076 physical or virtual serves. With appropriate software, dozens of virtual servers may reside on a single physical server. Users are unaware that they are not running on a dedicated server. ITSD, DOJ, and STF use this technique to reduce the number of servers, simplify management, and minimize software-licensing cost.

There are 50 servers that are dedicated to running Storage Area Networks (SAN) for the purpose of backing up and storage of large amounts of critical data. There are eight agencies that are currently Employing SANs; COR, DEQ, DLI, FWP, LEG, MDT, MSL, OPI SOS, and STF, MDT.

Appendix A – IT Inventory Analysis
Server Analysis

Servers by Manufacturer and Type							
	PC	Mid Tier	Main Frame	Other	Unknown	Total	Percent
Compaq	3	85	0	2	0	**90**	9.6%
Custom	3	0	0	0	0	**3**	0.3%
Dell	394	131	0	10	13	**548**	58.7%
Digital	1	0	0	0	0	**1**	0.1%
HP	19	13	0	2	3	**37**	4.0%
IBM	26	159	1	15	0	**201**	21.5%
ISB	1	0	0	0	0	**1**	0.1%
McData	0	6	0	0	0	**6**	0.6%
NCR	1	0	0	0	0	**1**	0.1%
USMicro	0	32	0	0	0	**32**	3.4%
Unknown	0	1	0	0	13	**14**	1.5%
Total	**448**	**427**	**1**	**29**	**29**	**934**	
Percent	48.0%	45.7%	0.1%	3.1%	3.1%		

Figure A-3. Servers By Manufacturer
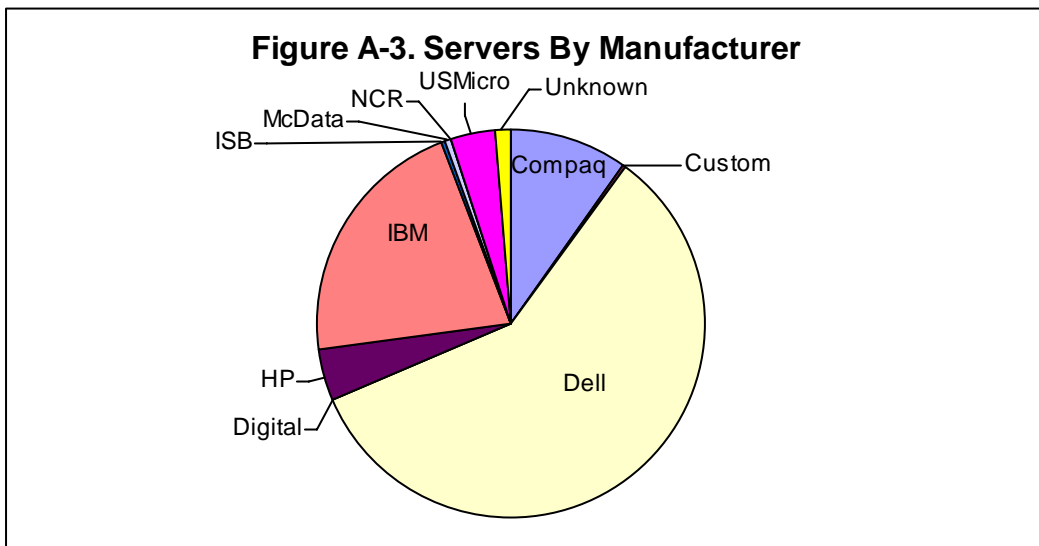
Discussion: By definition, a server is a multi-user computer that provides a specific type of service to client software running on other computers – usually PCs. For our purposes, the term server refers to a physical or virtual computer on which server software is running. A single server my have many applications running on it; therefore, the server may provide many different services to many different users on the network. Servers in this report include everything from a large mainframe down through mid-tier size servers and included large desktop computers if they are operating as a server.

Figure A-3 illustrates the breakdown of servers by manufacturer. Dell and IBM make up the larges portion of the state's servers, about 80%. With the merger of Compaq and HP, almost 14% of the state's servers are HP.

Appendix A – IT Inventory Analysis
Server Analysis

Servers by Operating System and Type							
	PC	Mid Tier	Main Frame	Other	Unknown	Total	Percent
AIX5	2	52	0	0	2	**56**	6.0%
AIX PV	0	4	0	0	0	**4**	0.4%
CITRIX	24	4	0	0	0	**28**	3.0%
ESX	0	12	0	0	0	**12**	1.3%
IBM AIX	0	65	0	0	0	**65**	7.0%
IBM Z/OS	0	0	1	0	0	**1**	0.1%
Linux	1	2	0	0	14	**17**	1.8%
Netware 6.5	176	5	0	12	0	**193**	20.7%
Netware PV	25	1	0	0	0	**26**	2.8%
Other	2	11	0	0	0	**13**	1.4%
RedHat Linux	3	0	0	1	0	**4**	0.4%
SUSE Linux 9	4	3	0	1	6	**14**	1.5%
SUSE Linux PV	2	7	0	1	0	**10**	1.1%
Windows PV	76	94	0	8	0	**178**	19.1%
Windows 2003	133	152	0	4	5	**294**	31.5%
Unknown	0	15	0	2	2	**19**	2.0%
Total	**448**	**427**	**1**	**29**	**29**	**934**	
Percent	48.0%	45.7%	0.1%	3.1%	3.1%		

**Figure A-4. Server Operating Systems**
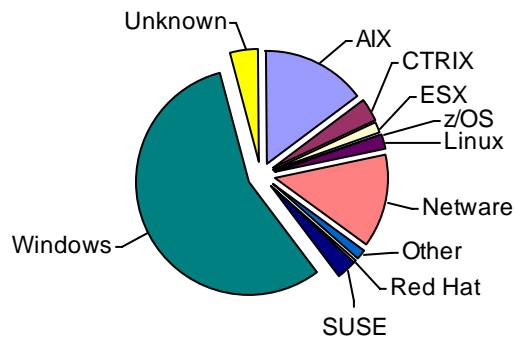
Discussion: The operating system controls the other application software running on the server. Windows is the predominate server operating system within the enterprise landscape. There are 14 separate operating systems currently in use throughout the state. This diversity contributes to the complexity associated with providing support and planning future growth strategies, while maintaining the enterprise infrastructure.

Figure A-4 illustrates the breakdown of server operating system by type.

Appendix A – IT Inventory Analysis
Server Analysis

Servers by Age		
Years	**Number**	**Percent**
<1	142	**0.152034**
1	278	29.8%
2	125	13.4%
3	111	11.9%
4	81	8.7%
5	50	5.4%
6	18	1.9%
7	6	0.6%
8	4	0.4%
9	0	0.0%
10	1	0.1%
>10	1	0.1%
Unknown	117	12.5%
Total	**934**	



Figur A-5. Servers by Age
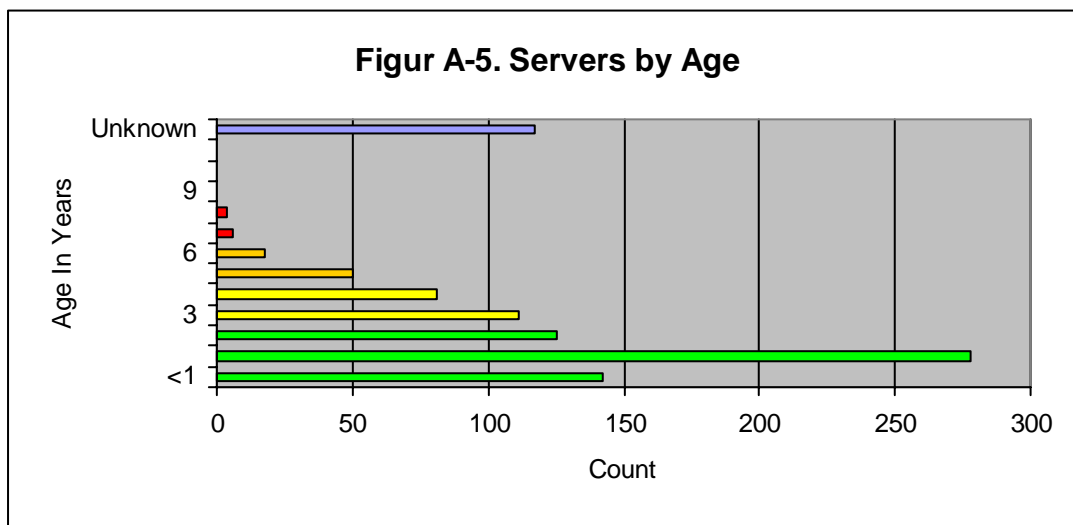
Discussion: Of the 934 servers identified within the survey, 79% are four years old or newer. Most hardware vendors commit to five years of parts availability for servers; therefore, five years is the reasonable upper limit for the life of a deployed server. There is, however, one server operating in COR that was put into operation in 1992.

Figure A-5 illustrates the age distribution of servers identified within the agency.

Appendix A – IT Inventory Analysis
Application Analysis

Applications By	Type	Number	Percent
	Commercial	149	16%
	Custom	392	43%
	Database	323	35%
	Other	45	5%
	Unknown	6	1%
	Total	**915**	**100%**

Figure A-6. Applications by Type
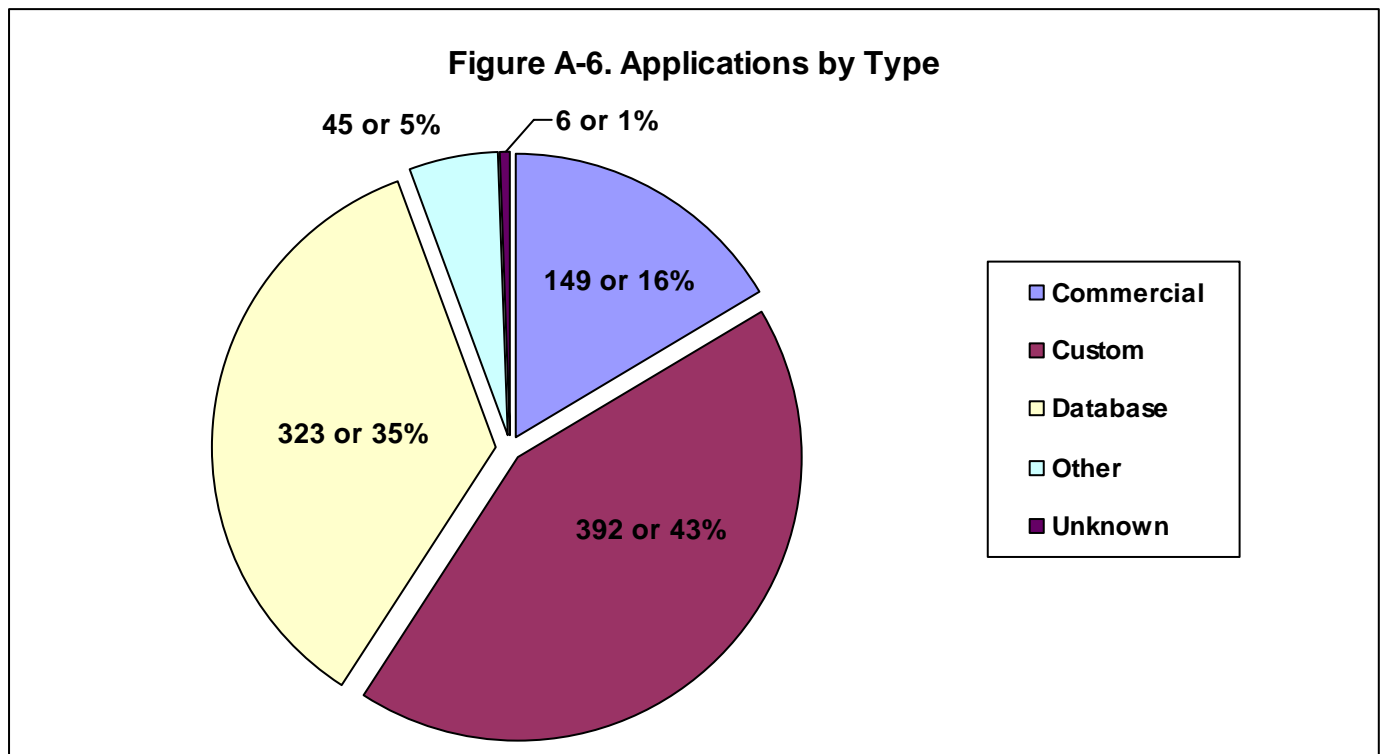
Discussion: Applications are software that can include single-user desktop applications to large system – wide applications and business- related utilities used by many users. Applications are used to carry out a wide variety of functions performed by agencies within the state government. These functions support internal, state-related business processes as well as external, public-related business transactions. The survey data does not reflect the single-user allocation.

Our applications are classified into three major categories; **commercially** available and procured, **custom** built, or a **database** (data storage) application. Only 16% of the applications used by the State of Montana are commercially available products. 43% are custom built to meet the unique needs of the state, or because a commercial application was not available.

Figure A-6 illustrates the breakdown of the state's major applications by type.

Appendix A – IT Inventory Analysis
Application Analysis

Applications By Age		Type of Application						Disaster Recovery		
	Age	Comm.	Cust	Database	Other	Unknown	Total	Yes	No	Total
	New	57	119	97	26	0	**299**	62	237	**299**
	Mature	85	209	185	17	2	**498**	115	383	**498**
	Declining	0	56	29	1	0	**86**	10	76	**86**
	Obsolete	6	6	10	0	0	**22**	11	11	**22**
	Unknown	1	2	2	1	4	**10**	0	10	**10**
	Total	**149**	**392**	**323**	**45**	**6**	**915**	**198**	**717**	**915**
Disaster Recovery	**Yes**	26	37	128	7	0	**198**	**22%**		

Figure A-7. Application Type By Age
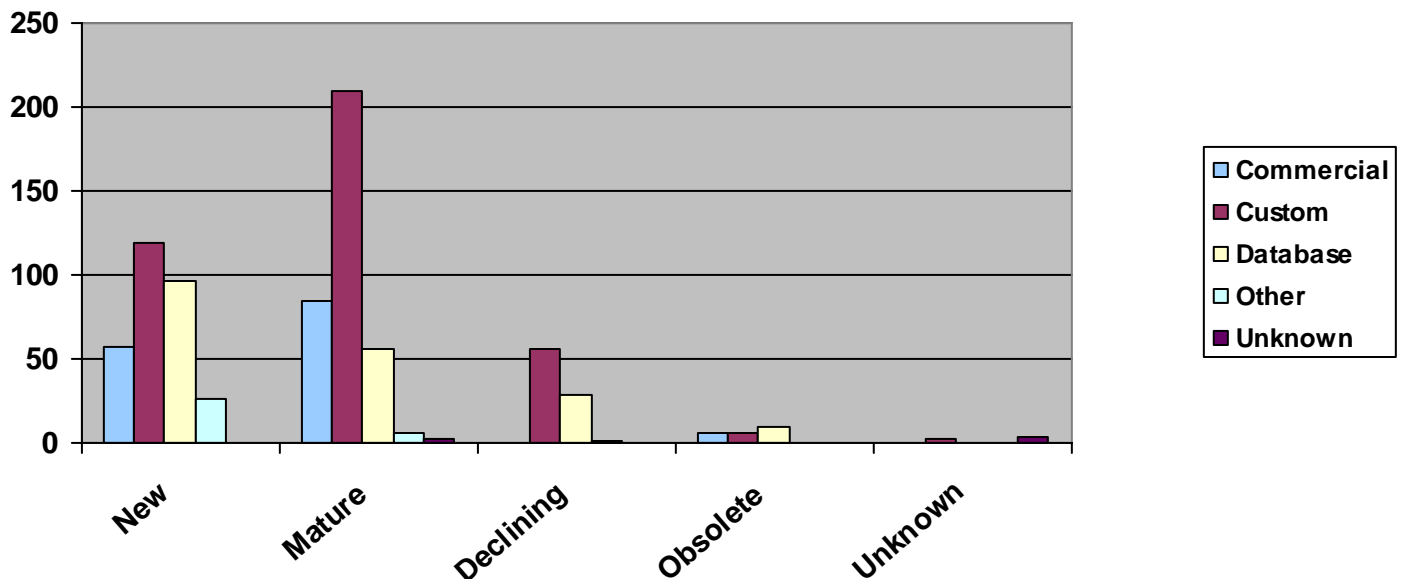
Discussion: Applications were rated by the agency as to there relative age ranging from new to obsolete for current purposes. A total of 107 applications are currently declining in age or obsolete, 62 of which are custom applications that will need to be upgraded or replaced in the near to immediate future.

Software lifecycle is predicated on the type of software and hardware platform being used. Any one of the following factors my require the replacement or updating of software; hardware equipment changes, operating system changes, user needs, manufacture updating and terminating support for older versions. At a minimum, operating system software upgrades should be timed to coincide with normal hardware replacement or when applications or middleware are undergoing a major upgrade.

Agencies will need to address lifecycle management of their software applications in their agency IT plan.

Figure A-7 illustrates the breakdown of applications by type and by age.

Appendix A – IT Inventory Analysis
Application Analysis

Applications by State Criticality	High					Criticality				Low
	1	2	3	4	5	6	7	8	9	10
Disaster Recovery Yes	8	12	50	11	9	12	11	28	7	31
Disaster Recovery No	42	98	38	62	69	95	22	98	8	157
Total	50	110	88	73	78	107	33	126	15	188

	unknown	Total	Percent
Disaster Recovery Yes	19	198	22%
Disaster Recovery No	28	717	78%
Total	47	915	

Figure A-8. Applications Critical to State Operation Rating
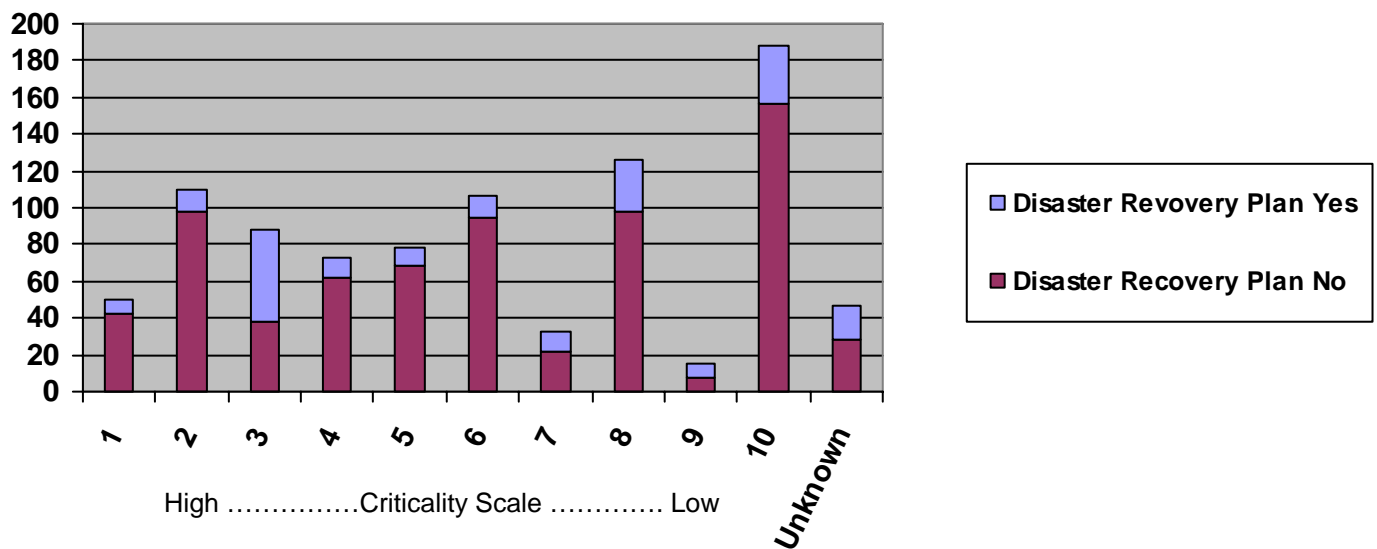
Discussion: Applications were also rated for their level of criticality to the continued operation of state businesses. The agencies were asked to indicate whether the application has a disaster recovery plan in place. A total of 78% of applications do **not** have a disaster recovery plan, 240 of which are highly critical to state operations.

Figure A-8 illustrates the breakdown of applications critical to state operations with an indication of the status of their recovery plan. A ranking of 1 on the chart indicates that these applications are considered most critical; a ranking of 10 indicated that they are least critical.

Appendix A – IT Inventory Analysis
Application Analysis

Applications by Criticality		Agency Critical					Disaster Recovery		
	Age	High	Med	Low	Unknown	Total	Yes	No	Total
	New	128	117	47	7	**299**	62	237	**299**
	Mature	280	175	42	1	**498**	115	383	**498**
	Mature	56	20	10	0	**86**	10	76	**86**
	Obsolete	9	10	3	0	**22**	11	11	**22**
	Unknown	3	2	1	4	**10**	0	10	**10**
	Total	**476**	**324**	**103**	**12**	**915**	**198**	**717**	**915**
Disaster Recovery	**Yes**	108	62	25	3	**198**	**22%**		
	No	368	262	78	9	**717**	**78%**		

Figure A-9. Applications Critical to Agency Operation Rating

Legend: Disaster Revovery Plan Yes; Disaster Recovery Plan No
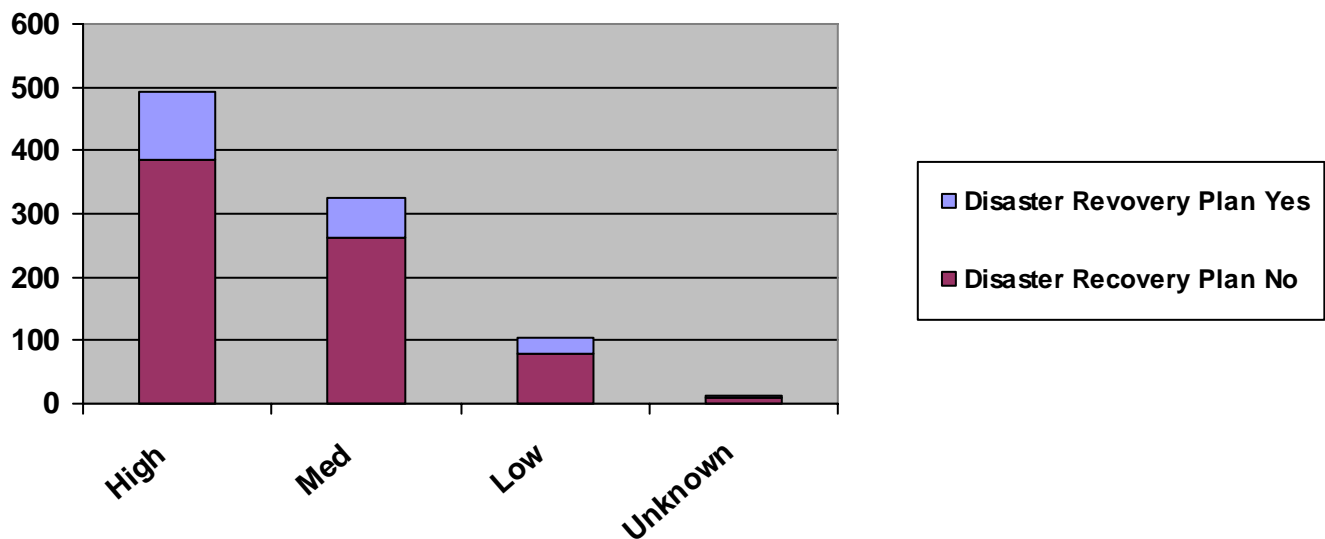
Discussion: The applications were also rated for their level of criticality to the continued operation of the agency business. A scale of high, medium, or low was used. 66% of the applications rates as critical to agency operation do **not** have a disaster recovery plan.

Figure A-9 illustrates the agency rating, along with the status of the disaster recover plan.

Finally, the applications were assessed determine if they were accessed via the web and whether they are available for public access. In total 454 or 49.6% were reported to be accessed via the web, and 332 or 36.2% were reported to be available for the public.

Appendix A – IT Inventory Analysis
PC Inventory Analysis

Personal Computers in Use								
FISCAL YEAR	PC's Purchased	PC's Retired	PC's In Service	Laptops Purchased	Laptops Retired	Laptops In Service	PC Avg Replace	Laptop Avg Replace
2002			9708			811		
2003	2627	2702	9633	1258	677	1392	27%	90%
2004	4239	2403	11469	1017	610	1799	37%	57%
2005	2297	2104	11662	336	200	1935	20%	17%
2006	2193	2190	11665	359	289	2005	19%	18%
							26%	**46%**

Figure A-10. Personal Computers is Use
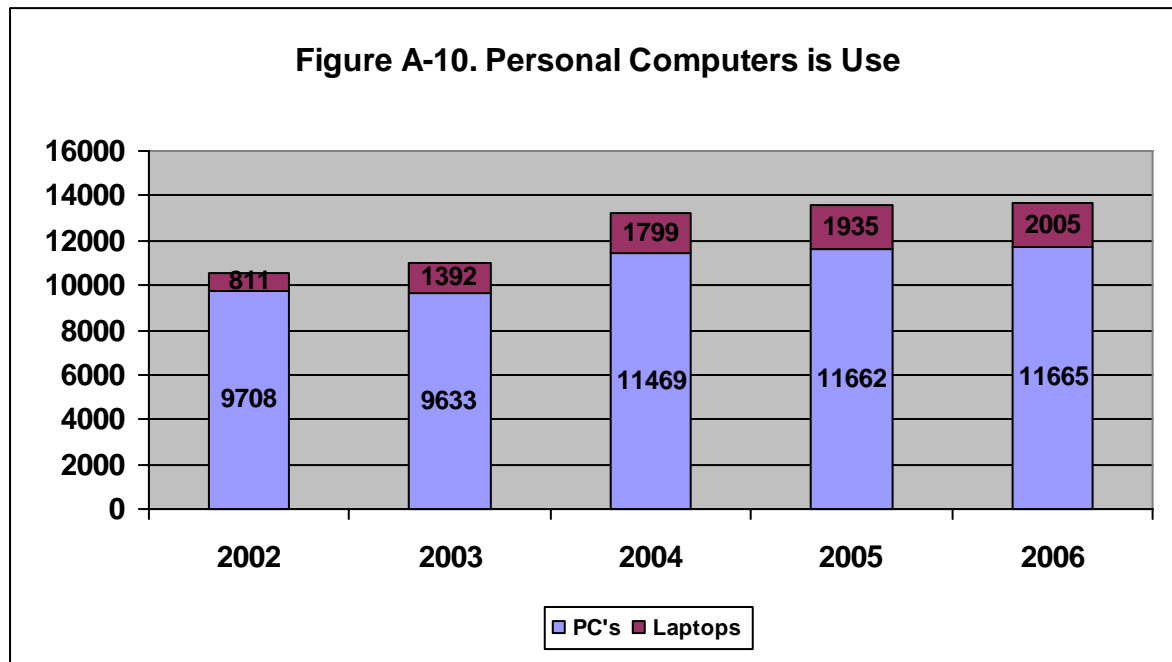
Discussion: Montana currently has 13,670 Personal Computers in service, with 2005 or 14.6% of those being laptop computers. There has been a 3% Increase in the number of Personal Computers from 2004 to 2006. The state's PC-standard is based on IBM and IBM-compatible equipment and selected software. The State has a term contract with IBM, Dell, and HP for PC acquisitions. While there has only been a moderate growth in the number of PC's, the number of Laptops is increasing while the overall number of desktop PC's remained stagnant during 2005 and 2006.
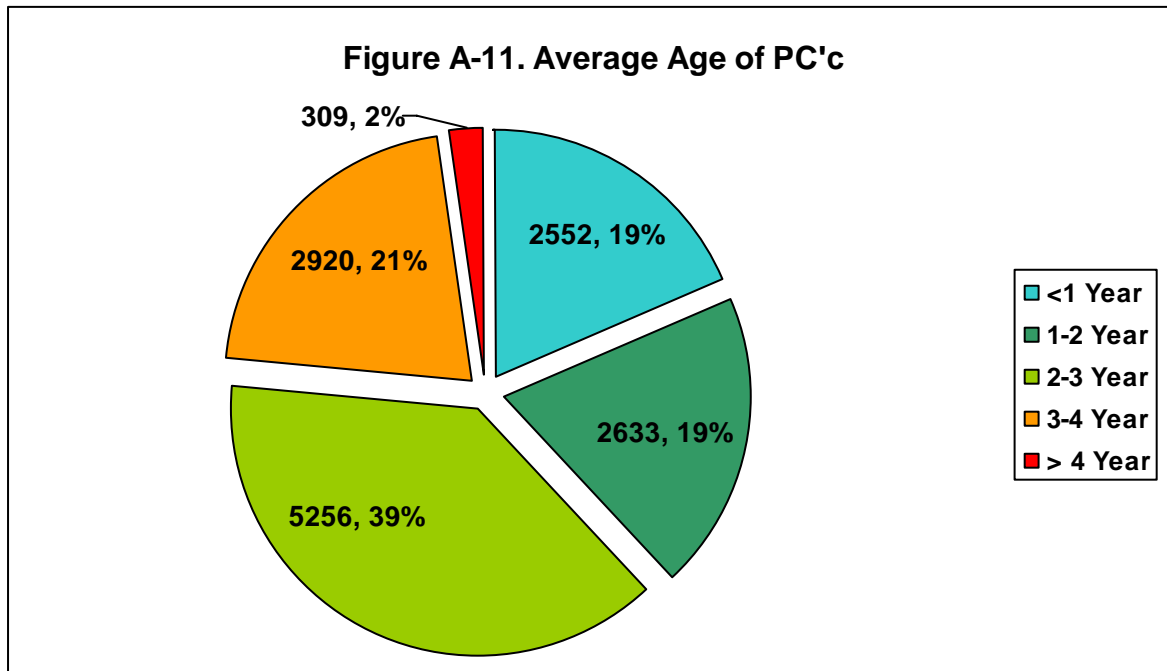
The state's policy for PC replacement is once every four years, which is consistent with industry and government practices. The actual PC replacement rate for FY05 and FY06 averaged only 19% for desktop computers and 17.5% for laptop computers.

Figure A-10 illustrates how the number of personal computers in use by the state has increased over time.

Appendix A – IT Inventory Analysis
PC Inventory Analysis

Average Age of PC's							
	Less Than 1 Year	1-2 Years	2-3 Years	3-4 Years	over 4 Years	Net Increase over 4 Years	Total
PC's	2193	2297	4239	2627	309	1957	11665
Laptop	359	336	1017	293	0	1194	2005
Total	2552	2633	5256	2920	309	3151	13670

Figure A-11. Average Age of PC'c

Discussion: Agencies will need to replace a minimum of 3,229 personal computers within the next biennium in order to mainline the state's policy for PC replacement of once every four years. At a cost of around $1.5K per unit, that represents a projected investment of $4.8M. Most agencies have not maintained the 25% a year replacement schedule and they will therefore require a larger capital expenditure in order to be current with state policy.

Beginning is January 2006, new computers will start shipping with the new Windows Vista operating system and we can expect to see changes in the associated office suites. The state will be face with evaluating upgrades and enterprise compatibility issues.

Figure A-11 illustrates the distribution of personal computers by age.
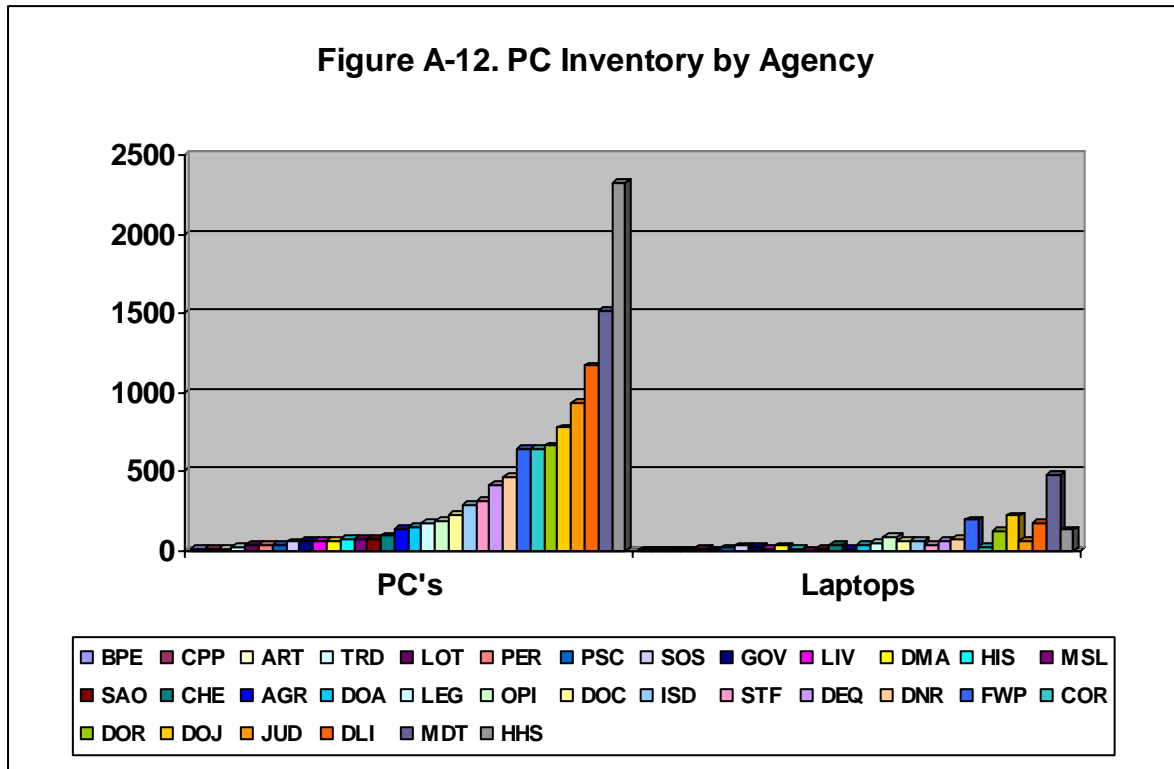
Appendix A – IT Inventory Analysis
PC Inventory Analysis

SFY 06 Inventory by Agency

AGENCY	PC's Purchased	PC's Retired	PC's In Service	Laptops Purchased	Laptops Retired	Laptops In Service	PC Avg Replace	Laptop Avg Replace
BPE	1	1	4	0	0	1	25%	0%
CPP	2	2	5	0	0	1	40%	0%
ART	3	2	9	1	0	3	33%	33%
TRD	2	3	18	0	0	1	11%	0%
LOT	8	8	32	0	0	10	25%	0%
PER	8	8	34	2	2	3	24%	67%
PSC	22	24	35	8	1	15	63%	53%
SOS	36	0	51	25	0	26	71%	96%
GOV	17	19	54	13	4	19	31%	68%
LIV	16	16	62	1	1	8	26%	13%
DMA	32	32	63	0	0	27	51%	0%
HIS	6	10	67	2	0	6	9%	33%
MSL	0	0	69	2	0	0	0%	0%
SAO	15	15	72	2	0	6	21%	33%
CHE	29	39	89	8	7	33	33%	24%
AGR	31	5	139	0	2	12	22%	0%
DOA	0	0	147	0	0	37	0%	0%
LEG	175	0	175	0	70	50	100%	0%
OPI	39	37	188	28	18	85	21%	33%
DOC	35	58	223	9	18	58	16%	16%
ISD	43	90	285	20	3	54	15%	37%
STF	60	60	312	6	6	35	19%	17%
DEQ	37	60	409	11	0	56	9%	20%
DNR	54	40	461	26	10	76	12%	34%
FWP	198	107	638	60	31	191	31%	31%
COR	224	200	640	7	5	25	35%	28%
DOR	0	104	660	0	6	122	0%	0%
DOJ	117	105	776	59	53	218	15%	27%
JUD	300	300	935	18	18	58	32%	31%
DLI	105	120	1167	17	28	168	9%	10%
MDT	28	192	1514	16	0	474	2%	3%
HHS	550	533	2332	18	6	127	24%	14%
Total	2193	2190	11665	359	289	2005	**19%**	**18%**

See chart on following page.

Appendix A – IT Inventory Analysis
PC Inventory Analysis

Figure A-12. PC Inventory by Agency

Legend: BPE, CPP, ART, TRD, LOT, PER, PSC, SOS, GOV, LIV, DMA, HIS, MSL, SAO, CHE, AGR, DOA, LEG, OPI, DOC, ISD, STF, DEQ, DNR, FWP, COR, DOR, DOJ, JUD, DLI, MDT, HHS

Discussion: The agencies with the largest number of personal computers are HHS, MDT, DLI, JUD and DOJ. MDT has the largest number of laptops due to the extensive amount of field work done by the agency. As indicated on the previous page, not all agencies are on a 25% @ year replacement cycle for personal computer.

Figure A-12 illustrates the distribution of personal computers by agency.